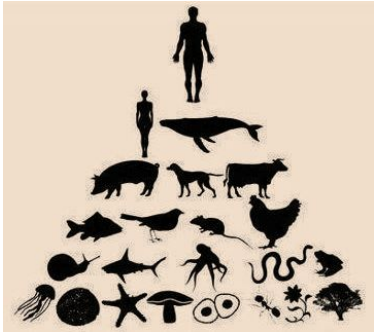
Design For More-than-humans

Biomimetic and Multi-species Interactions

David Sánchez, Tecnológico de Monterrey
Jeongki Lim, Parsons School of Design, The New School & Aalto University
Thursday, August 17th 2023
Aalto Summer School 2023: Living with Woods

Photo: Ximena Curiel

Dichotomy. Nature vs. Human



The root of our contemporary environmental crisis lies in our values as human specie because we assume things like:

1) A fundamental difference of wanting to separate humans from nature.

2) As humans we feel an inherent superiority over the non-human world.

3) As people we have the right to exercise control over the natural world, an ethic on the rights of natural elements is not restricted.

Disconnection: Numbness and Distraction

Our generation is the one is facing various crises:

1) Our senses are not well stimulated and seemed numb (food, spaces, materials..)

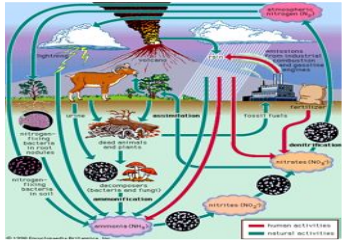
2) Perhaps we are oversaturated of information even the availability of wisdom

3) Design/Creation need to be constantly questioned and accepted collectively (Co-designed/Co-Created).

Naturalistic

Moralistic

Dominionistic



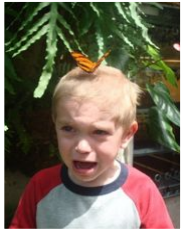
Scientific

Aesthetic

Unconscious

Symbolic

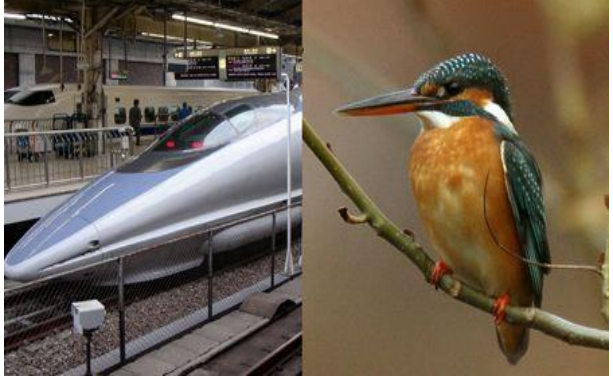
Utilitarian



Negativistic

Humanistic

9 recognized biophilic values
(Stephen Kellert, 2012)



Kingfisher/ Shinkansen Train Japan. (Westra, 2011)

Fractal Coast (Douglas, 2007 cc)

Solar Tree(Ross Lovegroove 2011)

Termite mound/Eastgate Building Harare(Mick Pearce, 1996)

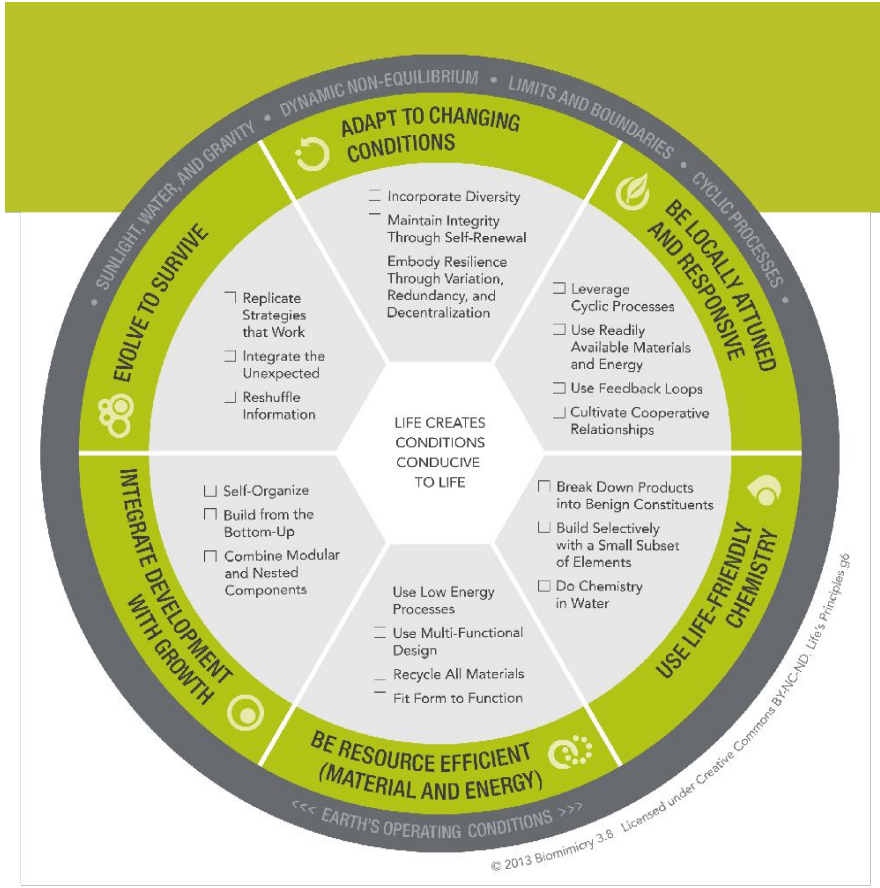
Biomimicry-Bionics-Biodesign-Biomimetics

(Concious emulation of nature's genius)

What Nature is telling us?

Life’s Principles

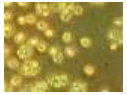
- Works with sunlight
- Use only the energy needed
- form follows function
- recycle everything
- reward for cooperation
- Protect diversity
- Demand local expertise
- Removes excess
- Touch the power of limits



Processes

Functions

Behaviours



Forms

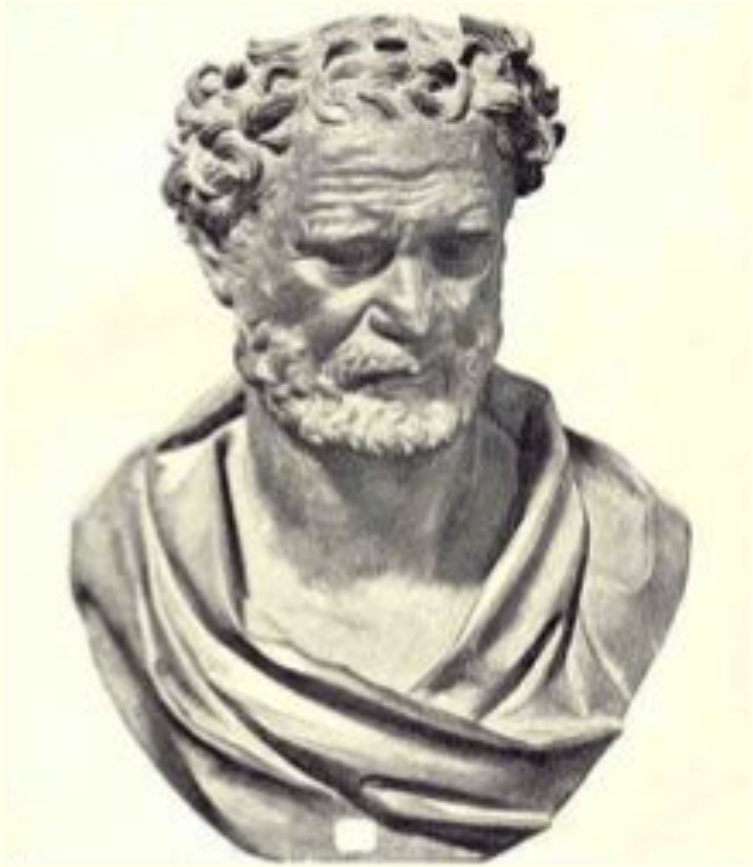
System organisation

Materials

Algorithms

'In art we imitate nature: when we weave we imitate the spider, when we build, the swallow, when we sing, the swan and the nightingale'

(*De sollert*., 20.974 A)

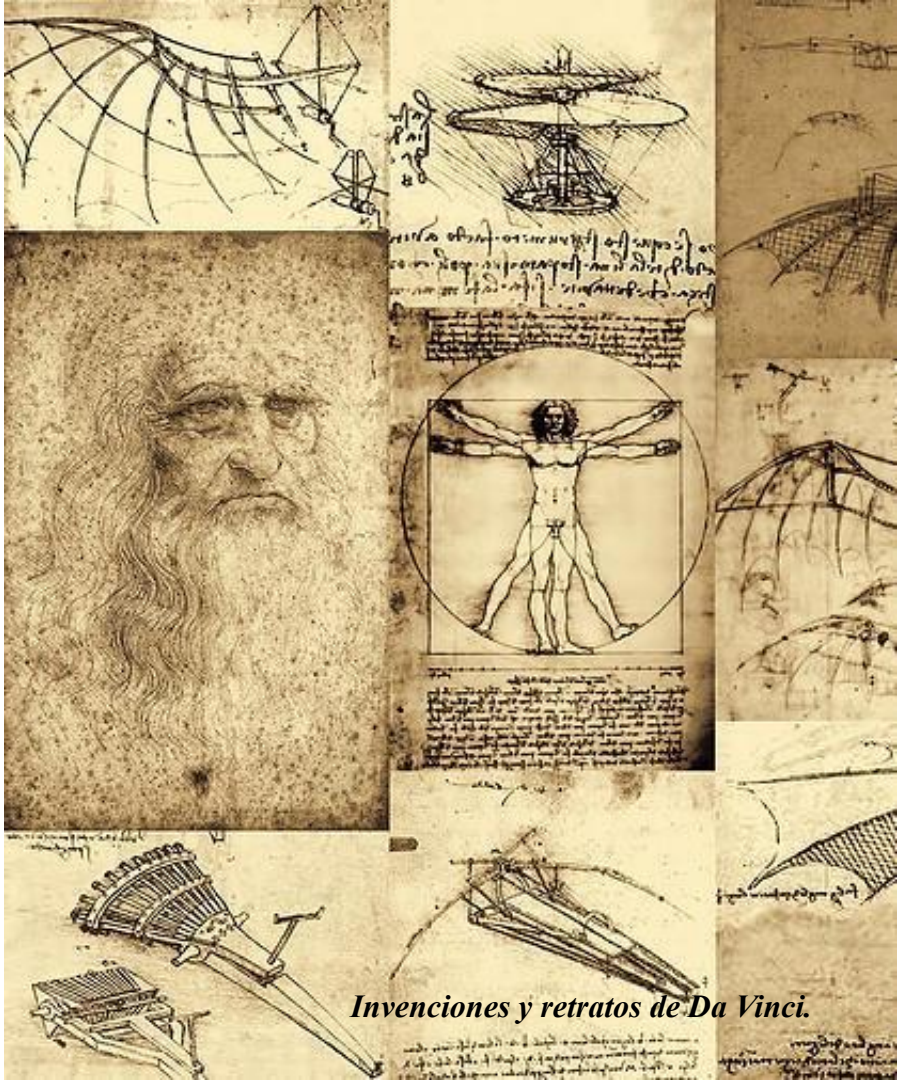


Democritus

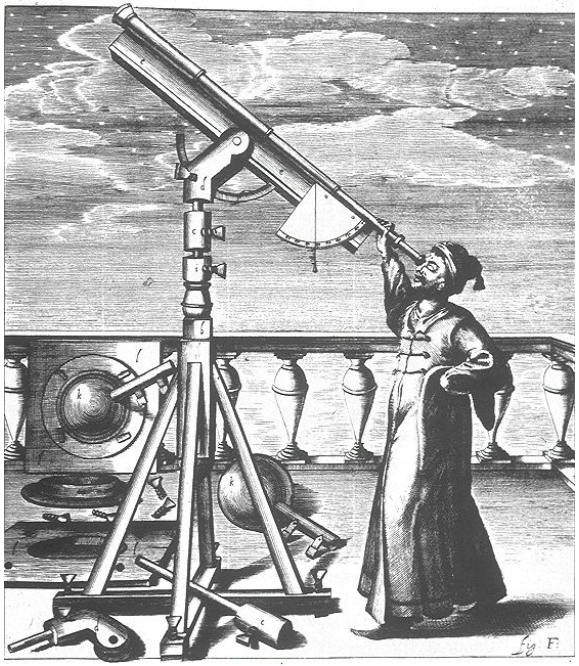
Imitatio = Inventio

-Reinassance-

- **Leone Battista:** 'there is no safer way to beauty than to imitate nature'
- **Shakespeare:** ... let your tutor be your own discretion: (...) never exceeding the modesty of nature ...
- **Dürer:** nature has to be 'deciphered' and its content extracted.



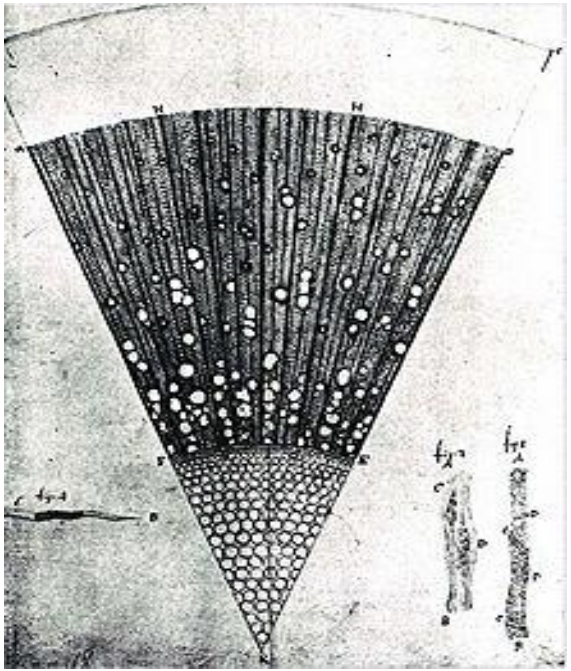
Invenciones y retratos de Da Vinci.



Galileo using his telescopic devices.

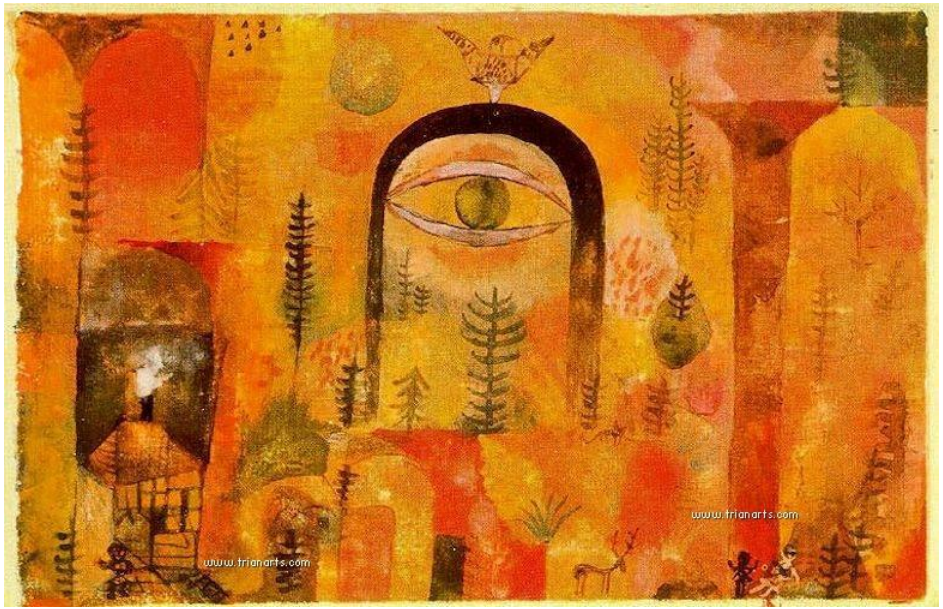
Scientific Revolution 17th-19th Century

- Quick accumulation of knowledge
- Nature begins to be reasonably verifiable



A microscopic section of a one-year-old ash tree (*Fraxinus*) wood, drawing made by Antoine van Leeuwenhoek

How do we understand fidelity, the truth that nature expresses?

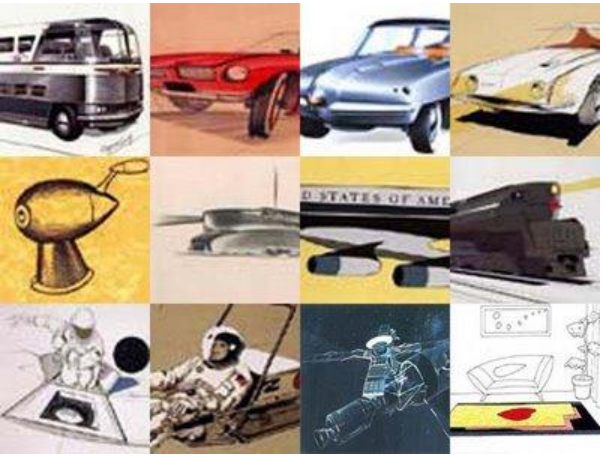


Pintura de Paul Klee

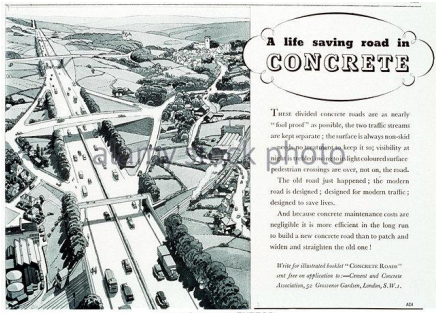
.

Paul Klee expressed 'we do not want to copy nature or imitate it, what we want is to be **able to configure something as nature shapes a fruit**'

The new landscape 20th Century



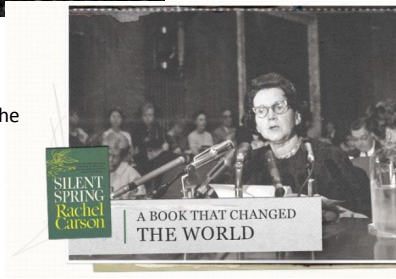
Modern life!



www.alamy.com - EXPECC

Georgy Kepes - New Landscape exhibition
MIT 1951

Rachel Carson and
Buckminster Fuller in the
60s



BioArquitecture

Caracol House, Mexico
By Javier Senosiain
Model: Snakes, sea shells

Munich Olympic Park,
By Frei Otto
Models: Tensegrity

Ciutat de les arts i les ciencias
By Santiago Calatrava
Model: Human body/bones

Eden Proyect, Cornwall
By Nicholas Grimshaw
Model: Bubbles/Beehive

Yellow Tree House, NZ
By Fock Associates
Model: Chrysalis, Trees

Gardens by the bay .Singapore
By Wilkinson Eyre
Model: Trees, sea shells, etc

Eastgate Building, Zimbabwe
By Mick Pearce
Model: Termite mounds

Research Pavillion
By ICT/ITKE Research
Model: Water Spider

Foating Ecopolis
By Vincent Callebout
Mmodel: lillypad

Evolutionary Architecture
By Eugene Tsui
Models: Birds, various sources

Product Design

Bone Chair
By Joris Laarman
Model: Tree growth

Pax Volute water Pump
By Pax Scientific
Model: Vortes, Spirals

Franco Lodato Design
By Franco Lodato
Model: Various

Sonar-Enabled Cane
By UltraCane
Model: Bat's Sonar

BioOrganic Designs
By Ross Lovegrove
Models: Various

BioInspired processes
By Nery Oxman/MIT
Model: Various

Cocoon Tents
By Various designers
Model: Coocons, Chrysalis

Invisible street light
By Jongoh Lee
Model: Tree branche

Owl Fan
By Silent Fan
Model: Owl feathers

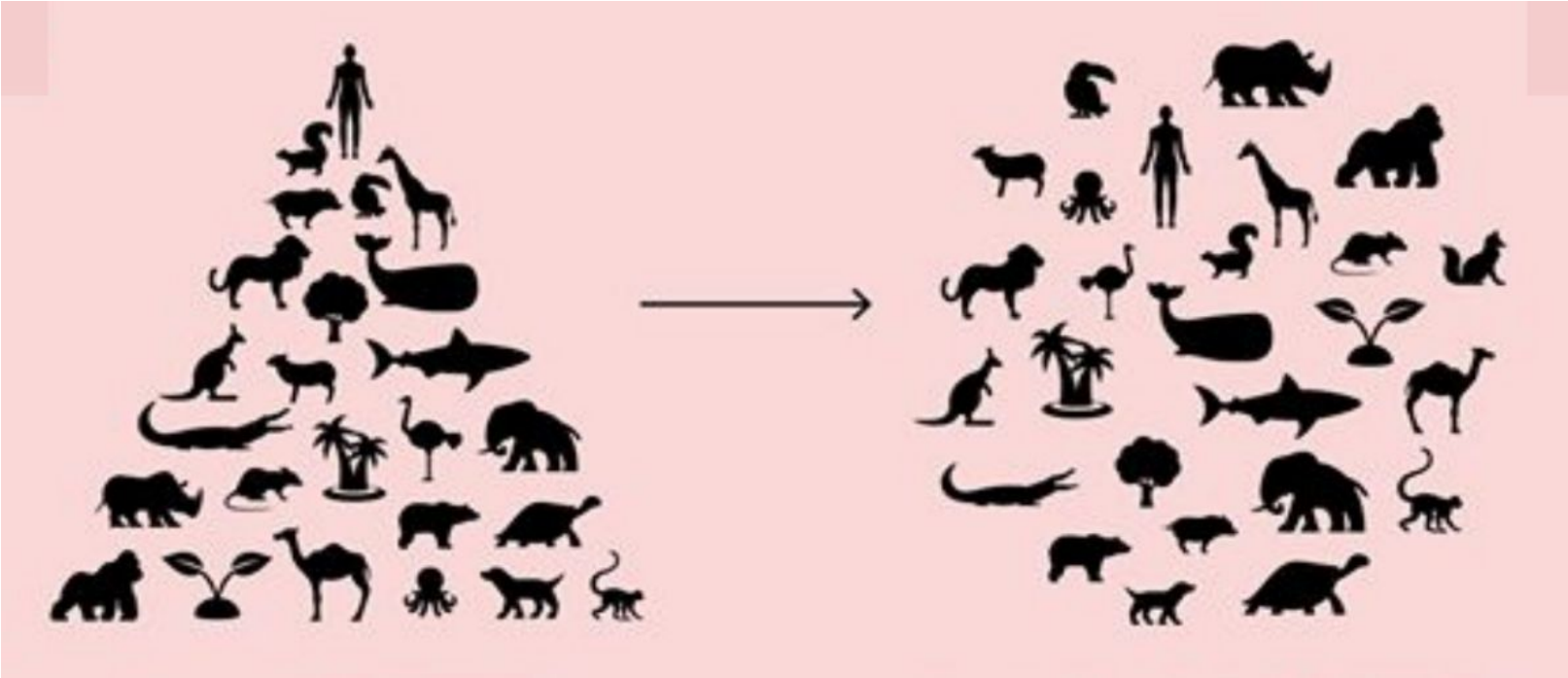
Luminaries 3Dp
By FOC
Models: Varios botanics

Rediscovering Nature

Multispecies Design Practice

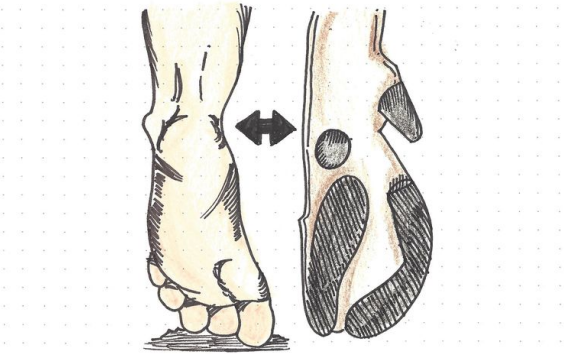
DS

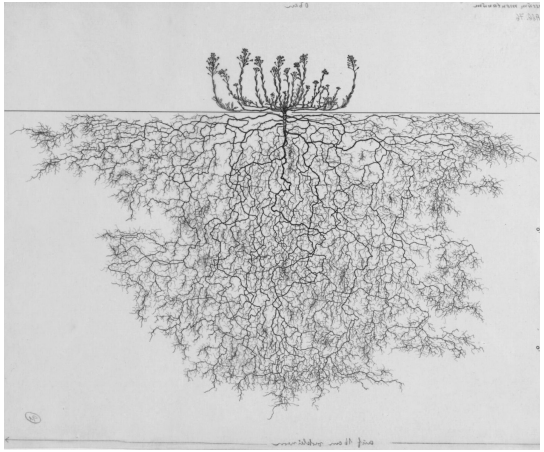
From an Anthropogenic to Symbiogenic (posthuman) worldview



True Empathy

“Our approach to animal studies invites us to use tools to try to get into their shells, legs, fins, and claws, because it is only then that we, as fellow human animals, can begin to understand, protect, and positively influence their world.
(Luisa Ruge)





Let's look for ways to interact with the language of nature, a language that shows us truth. Only then can we achieve a sustainable world.
(David Sánchez)

Bat and Swift housing (various authors)

Refugio (MaliArts, Mexico)

Designing for Animals

Designing for plants

Solaris por José Luis Gómez

Florence por Itzel Gálvez

Paradise C-T por Fabián Eduardo Iniesta

How does a multispecies design practice fit from other current sociocultural movements?

Post-Humanism?

Post-Humanism

Post-Anthropocentricism

Post-Dualism

Francesca Ferrando's *Philosophical Posthumanism*

Post-Humanism

Post-Anthropocentricism

Decentering the human in relation to the non-human

Post-Dualism

Francesca Ferrando's *Philosophical Posthumanism*

Post-Humanism

Post-Anthropocentricism

Post-Dualism

Opposing strict, rigid and absolute dualisms, particularly that can lead to hierarchical conceptions such as human vs. animal, mind vs. body

Francesca Ferrando's *Philosophical Posthumanism*

Post-Humanism

Post-Anthropocentricism

Human experience and activities in pluralistic rather than in generalized and universalized terms

Post-Dualism

Francesca Ferrando's *Philosophical Posthumanism*

Post-Humanist Design?

Aligns with

- actor-network theory
- feminist new materialism,
- object-oriented ontology
- transhumanism

Laura Forlano, Institute of Design, Illinois Institute of Technology, USA

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Posthumanism and Design

Abstract Since at least the mid-1980s, design has been dominated by a human-centered and user-centered paradigm. Currently, the implications of technological and environmental transformations are challenging designers to focus on complex socio-technical systems. This article traces emergent discussions around posthumanism from across a range of disciplines and perspectives, and considers examples from emerging design practices that emphasize the interrelations between human and nonhuman actors. Specifically, this article reviews literature from actor-network theory (ANT), feminist new materialism, object-oriented ontology, non-representational theory, and transhumanism to inform the development of new methodologies and practices in the field of design. Finally, this article presents critiques of posthumanism from critical race theory and decolonial theory to consider how emergent design perspectives might better support values such as equality and justice for humans and nonhumans that have been traditionally ignored in design processes.

Keywords
Posthumanism
Nonhuman
Feminist new materialism
Science and technology studies
Socio-technical systems

Received December 16, 2016
Accepted August 10, 2017

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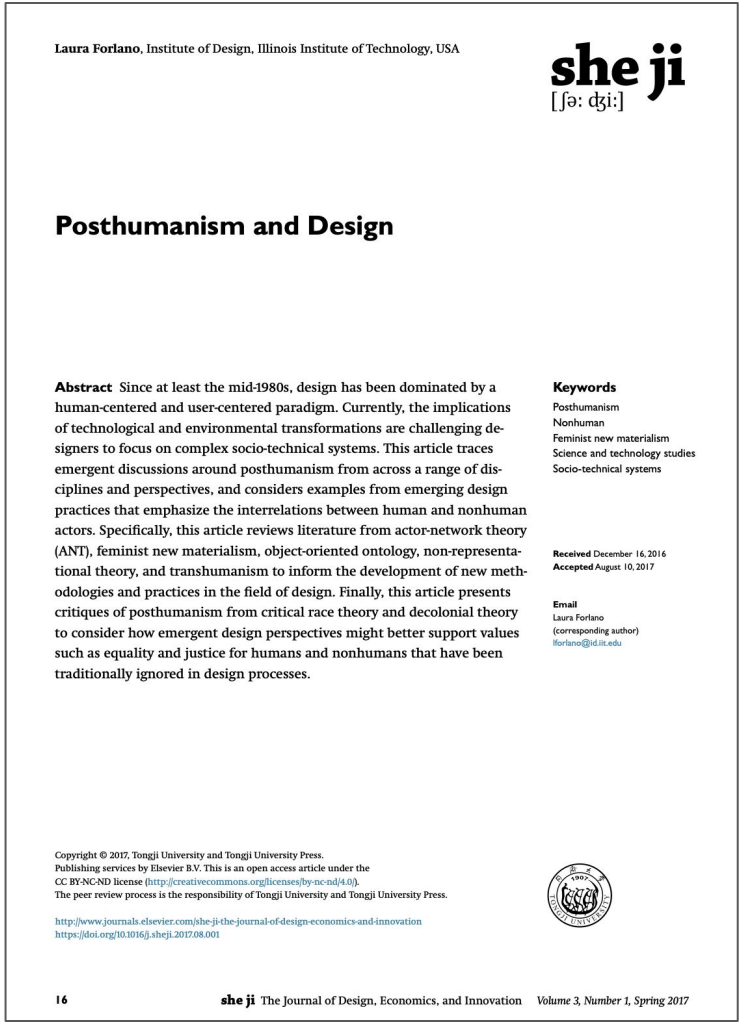
http://www.journals.elsevier.com/she-ji-the-journal-of-design-economics-and-innovation
https://doi.org/10.1016/j.sheji.2017.08.001

Aligns with

- actor-network theory
- feminist new materialism,
- object-oriented ontology
- transhumanism

Criticism from critical race theory and decolonial theory perspectives



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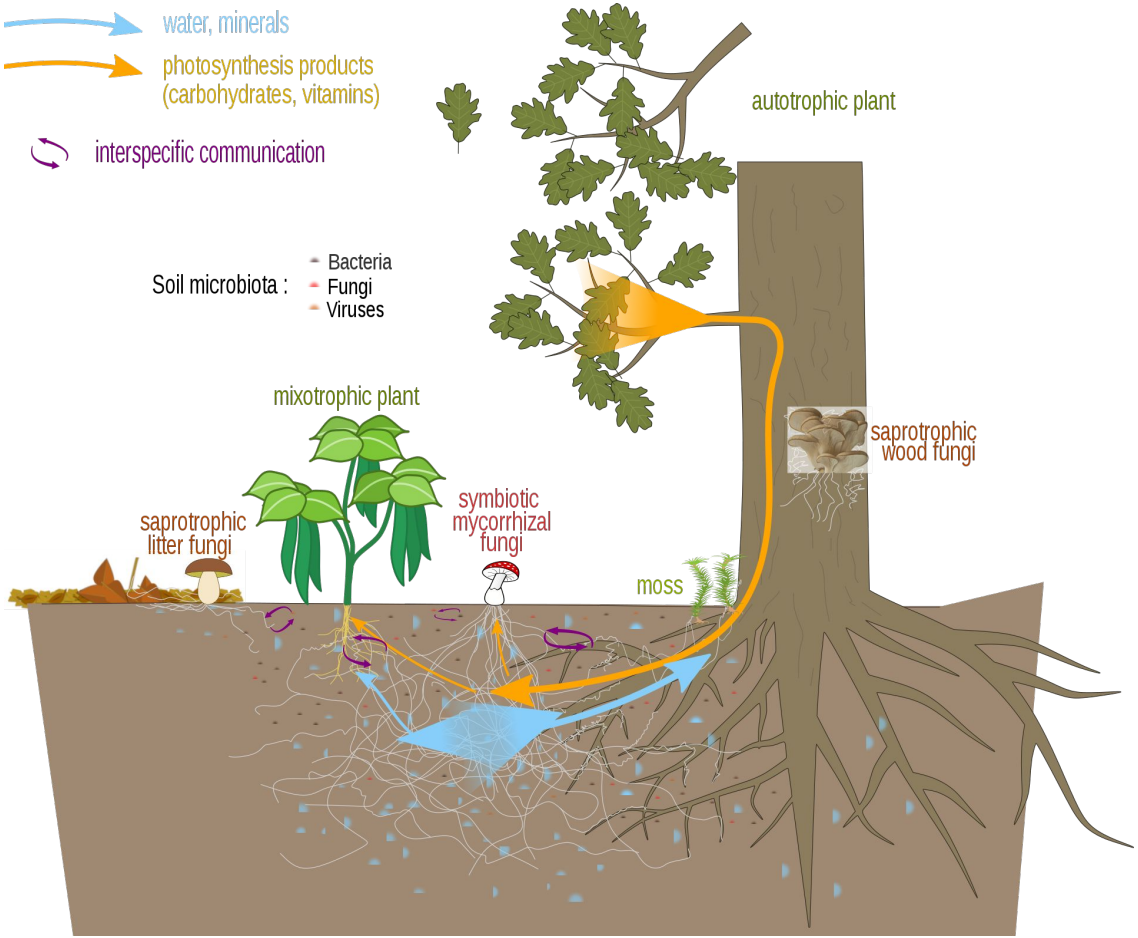
Intelligent Artifact?

Intelligent Natural Objects?

Forest as a Cooperative



Mycorrhizal network

‘Wood’ Wide Web

Mycorrhiza TimeLapse
4K

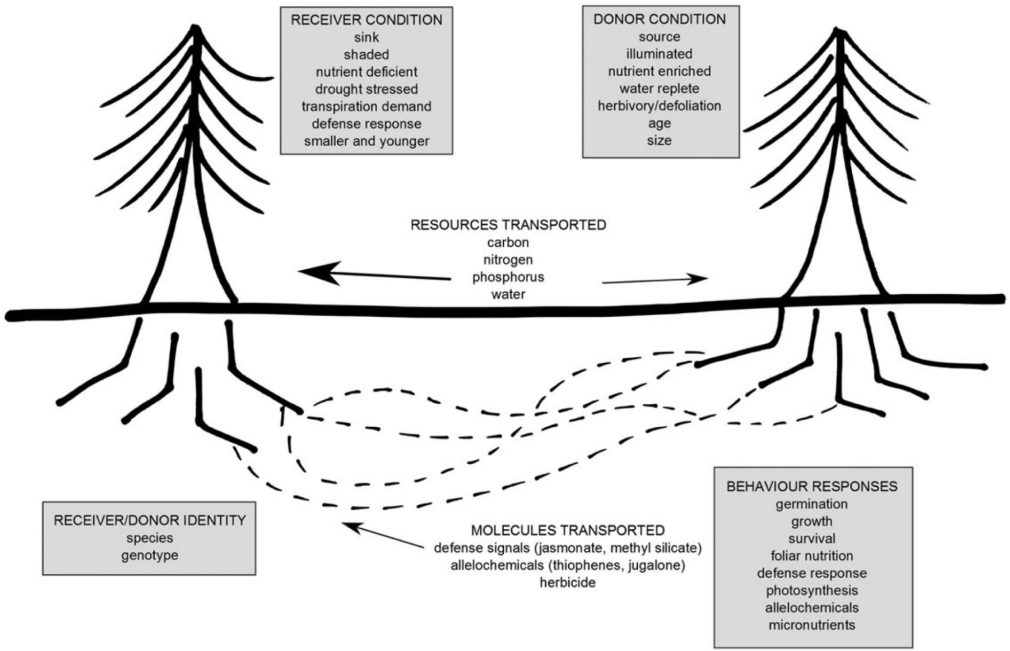


Figure 1. Schematic of resources and signals documented to travel through an MN, as well as some of the stimuli that elicit transfer of these molecules in donor and receiver plants.

Amongst the trees of different species can:

- transmit warnings that plants are being eaten by insects or attacked by pathogens
- send food or essential nutrients to neighbors of the same or different species.

In plants of the same species:

- mycorrhizae can transmit phosphorous and nitrogen from dying plants to healthy neighbor
- transmit “piss off” signals by sending toxins to plants competing for resources nearby

AoB PLANTS The open-access journal for plant sciences

Invited Review

SPECIAL ISSUE: Using Ideas from Behavioural Ecology to Understand Plants

Inter-plant communication through mycorrhizal networks mediates complex adaptive behaviour in plant communities

Monika A. Gorzelak, Amanda K. Asay, Brian J. Pickles and Suzanne W. Simard*

Department of Forest and Conservation Sciences, University of British Columbia, Vancouver, BC, Canada, V6T 1Z4

Received: 4 December 2014; **Accepted:** 26 March 2015; **Published:** 15 May 2015

Associate Editor: James F. Cahill

Citation: Gorzelak MA, Asay AK, Pickles BJ, Simard SW. 2015. Inter-plant communication through mycorrhizal networks mediates complex adaptive behaviour in plant communities. *AoB PLANTS* **7**: plv050; doi:10.1093/aobpla/plv050

Abstract. Adaptive behaviour of plants, including rapid changes in physiology, gene regulation and defence response, can be altered when linked to neighbouring plants by a mycorrhizal network (MN). Mechanisms underlying the behavioural changes include mycorrhizal fungal colonization by the MN or interplant communication via transfer of nutrients, defence signals or allelochemicals. We focus this review on our new findings in ectomycorrhizal ecosystems, and also review recent advances in arbuscular mycorrhizal systems. We have found that the behavioural changes in ectomycorrhizal plants depend on environmental cues, the identity of the plant neighbour and the characteristics of the MN. The hierarchical integration of this phenomenon with other biological networks at broader scales in forest ecosystems, and the consequences we have observed when it is interrupted, indicate that underground 'tree talk' is a foundational process in the complex adaptive nature of forest ecosystems.

Keywords: Complex adaptive systems; ectomycorrhiza; forests; mycorrhizal networks; plant behaviour; plant communication.

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Perspective | Published: 13 February 2023

Positive citation bias and overinterpreted results lead to misinformation on common mycorrhizal networks in forests

Justine Karst ✉, Melanie D. Jones & Jason D. Hoeksema

Nature Ecology & Evolution **7**, 501–511 (2023) | Cite this article

11k Accesses | **10** Citations | **1289** Altmetric | Metrics

Published: 28 March 1964

Tool-Using and Aimed Throwing in a Community of Free-Living Chimpanzees

JANE GOODALL

Nature **201**, 1264–1266 (1964) | Cite this article

4465 Accesses | **271** Citations | **288** Altmetric | Metrics

Hugo Van Lawick

Gouslougo Triangle Ape Project

Human uniqueness?

What has been done?

Habeas Corpus of Happy the Elephant

Personhood of Whanganui River, New Zealand

James Shook

© Mapcreator | OSM.org
Graphic: Gabrielle Smith, Natalie Leung, CNN

William James Harding/Alexander Turnbull Library, Wellington, New Zealand

Te Mataruru Marae -- or Māori communal place -- in Whanganui district in the 1880s. Photograph taken by the studio of William James Harding.

Alexander Turnbull Library, Wellington, New Zealand

A paddle steamer at Pipiriki on the Whanganui River, circa 1910.

Developing New Legal Construct

Historia/Shutterstock

Photo by Historia/Shutterstock. Māori chiefs sign the Treaty of Waitangi in New Zealand on February 6, 1840.

Natural entities with some of the same legal rights as humans like companies, and ships, people with disabilities, with guardians

Stone, Christopher D. "Should Trees Have Standing?—Towards Legal Rights for Natural Objects." Southern California Law Review 45 (1972): 450-501.

SHOULD TREES HAVE STANDING?—TOWARD LEGAL RIGHTS FOR NATURAL OBJECTS

CHRISTOPHER D. STONE*

INTRODUCTION: THE UNTHINKABLE

In *Descent of Man*, Darwin observes that the history of man's moral development has been a continual extension in the objects of his "social instincts and sympathies." Originally each man had regard only for himself and those of a very narrow circle about him; later, he came to regard more and more "not only the welfare, but the happiness of all his fellow-men"; then "his sympathies became more tender and widely diffused, extending to men of all races, to the imbecile, maimed, and other useless members of society, and finally to the lower animals. . . ."[1]

The history of the law suggests a parallel development. Perhaps there never was a pure Hobbesian state of nature, in which no "rights" existed except in the vacant sense of each man's "right to self-defense." But it is not unlikely that so far as the earliest "families" (including extended kinship groups and clans) were concerned, everyone outside the family was suspect, alien, rightless.[2] And even within the family, persons we presently regard as the natural holders of at least some rights had none. Take, for example, children. We know something of the early rights-status of children from the widespread practice of infanticide—

* Professor of Law, University of Southern California. A.B. 1959, Harvard; LL.B. 1962, Yale. Chairman, Committee on Law and the Humanities, Association of American Law Schools. The author wishes to express his appreciation for the financial support of the National Endowment for the Humanities.

1. C. DARWIN, DESCENT OF MAN 119, 120-21 (2d ed. 1874). *See also* R. WAELDER, PROGRESS AND REVOLUTION 39 *et seq.* (1967).

2. *See* DARWIN, *supra* note 1, at 113-14:

> . . . No tribe could hold together if murder, robbery, treachery, etc., were common; consequently such crimes within the limits of the same tribe "are branded with everlasting infamy"; but excite no such sentiment beyond these limits. A North-American Indian is well pleased with himself, and is honored by others, when he scalps a man of another tribe; and a Dyak cuts off the head of an unoffending person, and dries it as a trophy . . . It has been recorded that an Indian Thug conscientiously regretted that he had not robbed and strangled as many travelers as did his father before him. In a rude state of civilization the robbery of strangers is, indeed, generally considered as honorable.

See also Service, *Forms of Kinship* in MAN IN ADAPTATION 112 (Y. Cohen ed. 1968).

“[I]ndivisible and living whole, comprising the Whanganui River from the mountains to the sea, incorporating all its physical and metaphysical elements.”

Version
as at 30 November 2022

Te Awa Tupua (Whanganui River Claims Settlement) Act 2017

Public Act	2017 No 7
Date of assent	20 March 2017
Commencement	see section 2

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Note

The Parliamentary Counsel Office has made editorial and format changes to this version using the powers under subpart 2 of Part 3 of the Legislation Act 2019.

Note 4 at the end of this version provides a list of the amendments included in it.

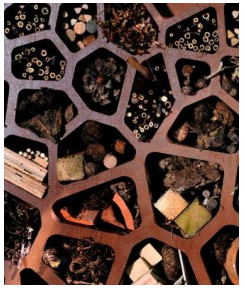
This Act is administered by the Ministry of Justice.

So what?

Thinking like a tree/bird/forest provides us with ethical behavior and a creative lens to solve problems.

The ability to recognize the patterns of nature and apply them is today fundamental

We all have the ability to re-imagine the intentions of our living planet.



Biodiversity bridge Netherlands cc)

Bee and flower in symbiosis (cc, 2012)

Treehouse forrest(concept)

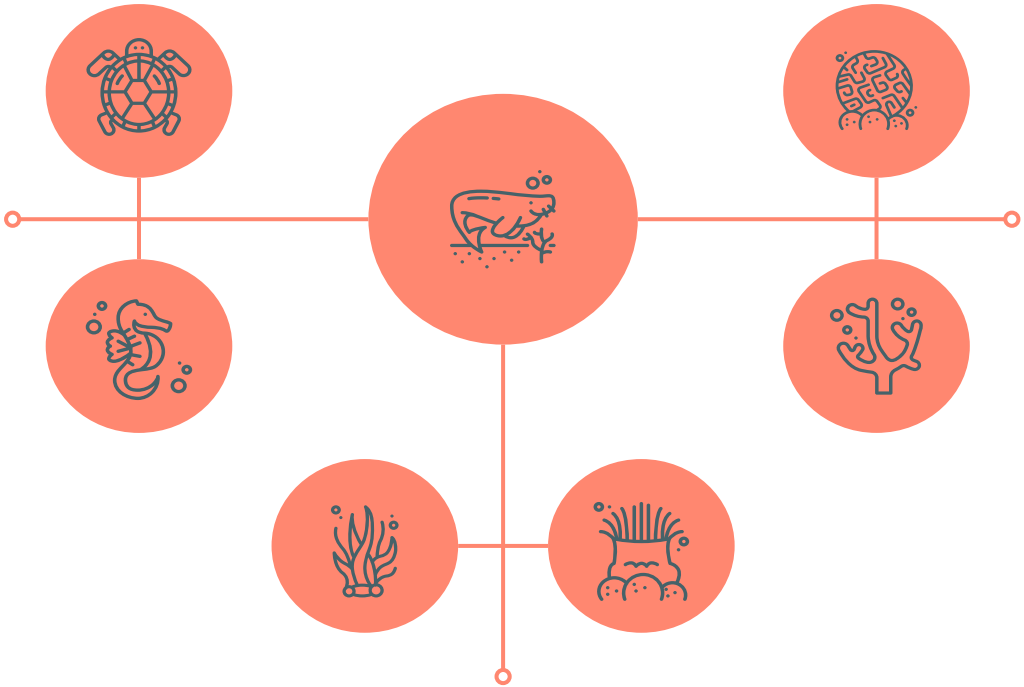
Biomatrix Living machine, Manila

Gardens by the bay, Singapore

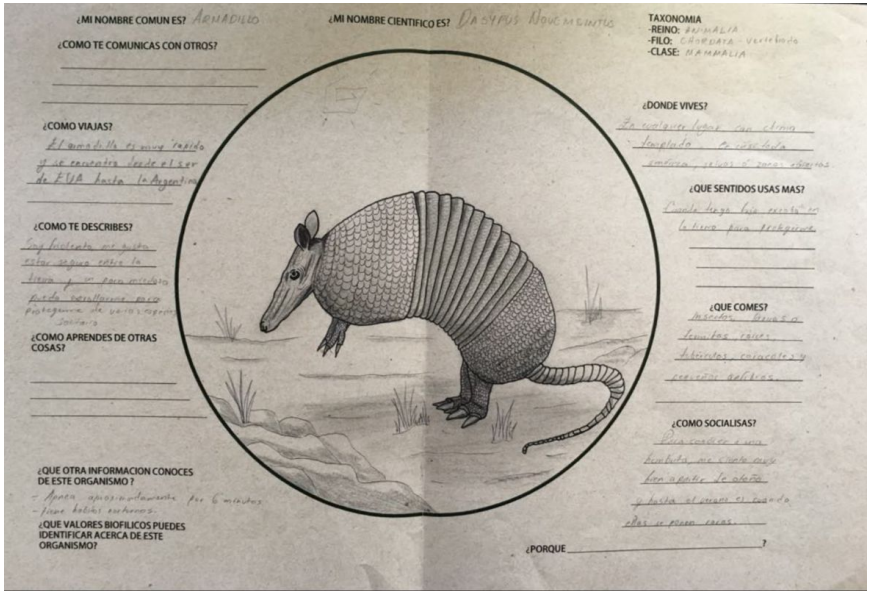
Interaction with other species is key for co-designing a bio-civilization

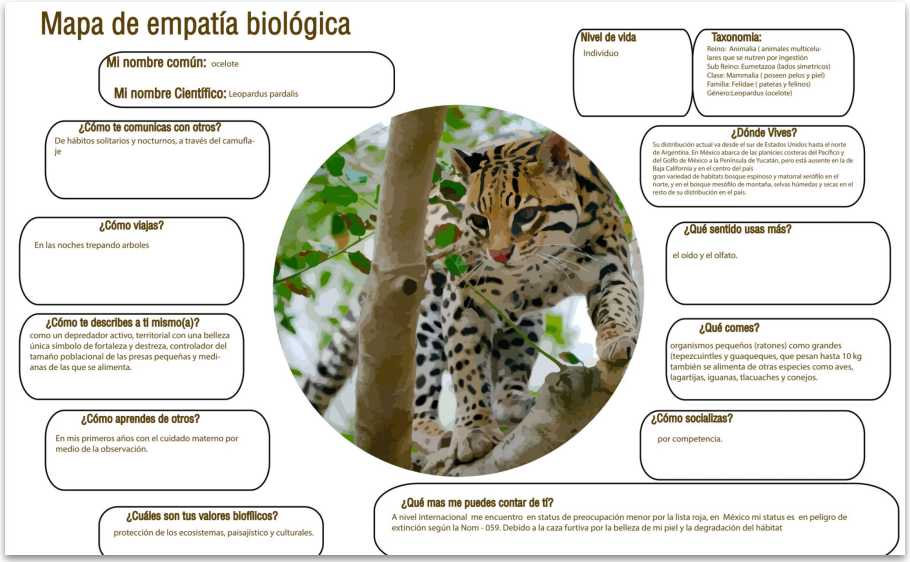
Activity

ETNOGRAPHICAL AND ETHOLOGICAL TOOLS



Biological Empathy Mapping





Multispecies Design Strategy

Discuss as a team and write a short statement that includes how you will consider the impact of your works from multispecies perspectives. You can include:

- How are you going about the life principles and biophilic values and patterns?
- How will you increase your knowledge in this space?
    - Work with local biologists
- How will you build in the power mechanism for non-human species?
    - Work with wildlife preserve foundations

Shanghai 2100. (Luc Schuiten,2009)

Thank you!